QUESTIONS ON SAFE WOOD/COAL STOVE INSTALLATIONS????

ARE ALL WOOD/COAL STOVE ALLOWED TO BE INSTALLED?
NO, only stoves approved by accredited testing laboratories shall be accepted. [See page 1 of the attached brochure]. These stoves will have a permanent label affixed to them.

Used stoves may be approved by the Building or Fire Department.

WHAT ABOUT MY CHIMNEY? CAN I USE MY EXISTING FIREPLACE?
All chimneys must be lined with either clay or stainless steel. For safety reasons no unflued chimney is allowed to vent wood/coal stoves.

CAN I USE ANY OTHER METHOD OF VENTING MY STOVE?
YES, you can vent into a U.L. approved all-fuel pipe or you can construct a masonry chimney.

WHAT ABOUT THE ACTUAL INSTALLATION?
Read the attached brochure for specific clearance requirements from combustibles, breaching walls, ceilings, etc.

HOW DO I GET A BUILDING PERMIT?
Fill out the following information on the attached building permit application.

[1] NAME OF THE OWNER, THE OWNERS ADDRESS
[2] BUILDER - WHO WILL INSTALL THE STOVE? YOU, A COMPANY?
[3] ESTIMATED COST - THE COST OF THE STOVE AND ANY OTHER MATERIALS USED IN THE INSTALLATION.
[4] DESCRIBE PROPOSED CONSTRUCTION - COPY ALL OF THE INFORMATION FROM THE LABEL ON THE STOVE: TELL US HOW THE STOVE WILL BE VENTED: ON WHAT LEVEL THE STOVE WILL BE LOCATED (1ST FL, ETC.) AND WHICH ROOM (FAMILY ROOM, ETC.) IT WILL BE INSTALLED.

HOW DO I GET A CERTIFICATE OF USE FOR MY INSURANCE COMPANY?
After the building permit has been approved you will request an inspection to ensure that the stove has been installed property. If it has, you will receive a "certificate of use" from the Building Department. Your insurance company may request a copy of this document for their records.
Failure to prove that your stove has received a "certificate of use" may void your insurance.

I DON'T UNDERSTAND THE STATE BUILDING CODE REQUIREMENTS. WHO CAN ANSWER MY QUESTIONS?
The Building Inspector is available 11-12 and 3:30-4:30 daily by coming in to the office or calling 762-1240 extension 202.

WHAT IS THE PROCEDURE, AGAIN?

1. A BUILDING PERMIT MUST BE OBTAINED.
2. REQUEST AN INSPECTION TO CHECK THE INSTALLATION.
3. YOU WILL RECEIVE A CERTIFICATE OF USE AFTER THE STOVE HAS BEEN INSPECTED AND APPROVED. YOU MAY NEED TO GIVE A COPY OF IT TO YOUR INSURANCE COMPANY.

REPRINTED/REVISED: 9/2/98

Executive Office of Energy Resources - State Building Code Commission

The Commonwealth of Massachusetts

COAL & WOOD STOVE

installation guide

Edward J. King · Governor

TABLE OF CONTENTS

With the increasing cost of gas, oil and electricity, there has been a renewed interest in the use of wood and coal for home heating. Historically, wood has been an important fuel source for most of the world, and if used correctly can be a viable alternative for space heating in Massachusetts. The demand for coal is also increasing, chiefly because of its price.

In 1977 in Massachusetts, woodburning stoves accounted for an average of 25 fires per month, the resulting damage to property exceeding $100,000 per month. Since that time there has been a tremendous increase in the use of woodstoves, and fires have increased proportionately. Investigations by the Massachusetts Department of Public Safety indicate that in almost every instance, these fires were due to faulty operation/maintenance or installation. In addition to the risk of fire, faulty installations may expose homeowners to serious financial risks as well since insurance companies may not honor a claim from a homeowner using a woodburning stove if the stove was installed without a building permit. The State Building Code Commission believes that enforcement of its regulations governing safe woodburning appliance installation will do much to prevent the hazards which may result from non-compliance.

To heat homes safely and efficiently with wood or coal, homeowners should understand 1) the characteristics of the fuel; 2) proper stove and heater operating and maintenance procedures; 3) different types of stoves and heaters; and 4) proper installation of them. We will address all of the above issues in this publication.

Though wood is a renewable resource, it is not a fuel that we can use carelessly. Massachusetts forests are threatened by overuse and by improper cutting practices. When harvesting wood, proper woodlot management practices should be followed. There is information available on how to practice good woodlot management and a list of helpful sources is found on page 15 of this booklet.

Using coal or wood as an alternative fuel should not be thought of as a substitute for basic conservation and weatherization of a home. Conservation measures should at least include insulation and weatherstripping. Keep in mind that a woodstove is not nearly as efficient in an uninsulated home.

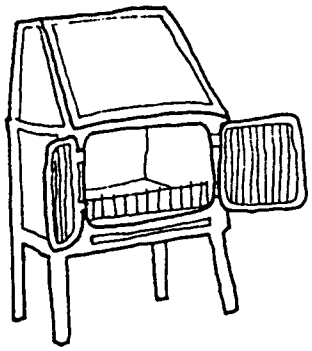
For efficient use of your fuel the sizing of a stove is important. In many instances coal or woodstoves should be used as a supplemental heating system and not as the main source of heating for an entire house. Many stoves are radiant heaters and are not intended to heat more than the room in which they are placed. An oversized stove will either overheat the room it is in or cause excessive creosote buildup in the chimney and waste of wood. If your stove is sized properly and loaded correctly to allow for complete combustion, through proper damping, then efficient and clean use of the fuel and the stove will be accomplished.

When burning wood, some thought should be given to its dryness. Use of well-seasoned wood is most advisable and you should not hesitate to burn softwoods; it creates a hot enough fire and the creosote buildup is not bad if it is mixed during burning with some hardwood. This use of softwoods, even inferior softwoods or scrap wood, provided it is well-seasoned, keeps fuel wood costs down.

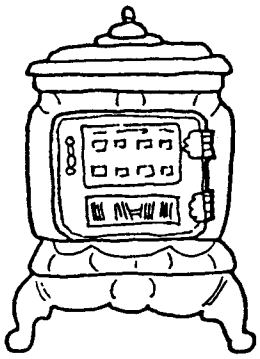
This publication has been prepared by the State Building Code Commission with the Executive Office of Energy Resources in recognition of a need to inform the public and local building officials. New sections have been added in response to a need for more consumer information.

It is hoped that this expanded fourth edition will further inform and provide the necessary information to safely heat with wood and/or coal.

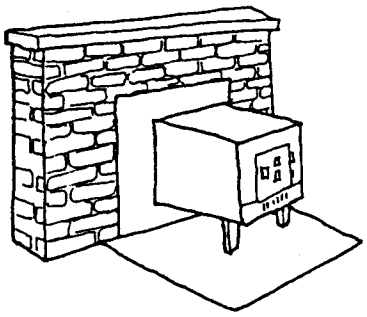
COMMON SOLID FUEL BURNING ROOM HEATERS



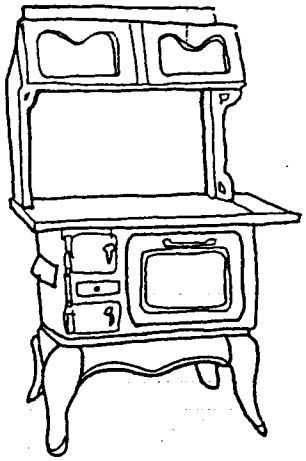
COMBINATION STOVE



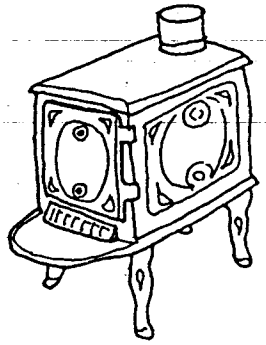
PARLOR STOVE



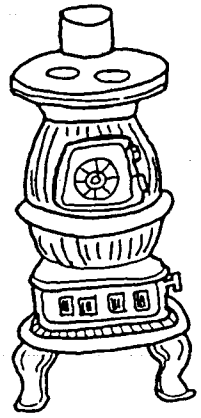
FIREPLACE STOVE



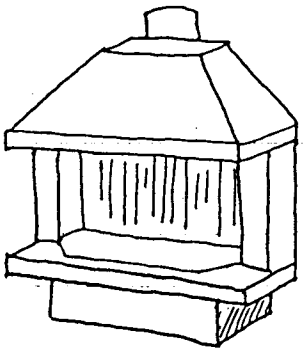
KITCHEN STOVE



BOX STOVE



POT BELLY STOVE



FREE STANDING FIREPLACE

Solid Fuel Burning Room Heater: (wood or coal stove)	A freestanding fire chamber assembly of the circulating or direct radiation type tested to UL 1482 and/or ANSI/UL 737 as applicable. A room heater shall not be connected to duct work or other heat distribution equipment which would make it function as a central heating appliance.
Radiant Stove:	A solid fuel burning appliance in which the exterior of the fire chamber directly radiates its heat to the room.
Circulating Stove:	A solid fuel burning room heater in which the fire chamber is surrounded by a jacket so that air flows past the fire chamber by convection or forced air circulation; or any side of a radiant stove with a heat shield.
Chimney:	A primarily vertical enclosure containing one or more passageways for venting combustion wastes.
Factory-Built Chimney:	A chimney that consists entirely of factory made parts designed for unit assembly without requiring field construction (tested to U.L. 103).
Masonry Chimney:	A field constructed chimney of solid masonry units, brick, stone, listed hollow masonry or reinforced concrete.
Flue Liner:	(a) Fireclay (ASTM315), or (b) equivalent not less than 5/8" thick, or (c) material tested to 1700 degrees Fahrenheit.
Coaling:	The process by which burning wood is broken down to release heat energy, gases and form coals.
Metal Chimney: (smokestack)	A field constructed chimney made of metal. (Not permitted in residential construction.)
Central Heating Appliance:	A solid or solid/liquid fueled boiler or warm air furnace tested to the applicable standards listed in Appendix B and contained in the applicable Rules and Regulations listed in Appendix Q.
Chimney Connector:	A stovepipe within the room which connects the solid fuel burning appliance to a chimney.
Masonry Fireplace:	A field constructed masonry fire chamber.
Factory Built Fireplace:	A fire chamber, its chimney, and related parts consisting entirely of factory made parts designed for unit assembly. These shall be tested and labeled by an approved testing agency to U.L. 127.
Steel Fireplace Liner:	A unit which incorporates a firechamber liner and air jacket, with or without circulating air ducts, which is built in as an integral part of a completed fireplace.
Airtight Stoves:	In an airtight stove, the only source of combustion air is the inlet (air vent). The amount of air entering is regulated by an inlet damper control.
Sheet Metal Stoves:	A stove made with less than 1/8 inch sheet of metal.
Plate Steel Stoves:	Plate steel stoves are constructed of sheet steel 1/8 inch or thicker and welded together. Some are lined with firebrick to protect the stove and dissipate the heat more evenly.

Cast Iron Stoves:	Cast iron stoves are fitted sections of cast iron with joints of asbestos cement.
Combination Furnaces:	Units designed for multi-fuel use.
Used Solid Fuel Appliances: (wood and coal stoves)	Units previously installed and in use.
Fireplace Insert:	A piece of heating equipment inserted entirely and sealed into a completed masonry fireplace fire chamber to adapt the fireplace for circulating warm air use and designed solely for that purpose.

Notes:

a. Door assemblies, grills, duct work or mechanical blowers need not be entirely confined to the fire chamber so long as they do not serve as direct sources of radiant heat.

b. There are no test standards or labeling requirements for this type of fireplace insert.

c. A building permit is required for the installation of this type of fireplace insert.

REGULATIONS

After obtaining the permit, there are three major areas in the stove installation process to consider. First, the stove; second, the chimney; and third, the actual installation.

First: All new woodburning stoves installed in Massachusetts must be tested and approved to U.L. 1482 and/or U.L. 737 as appropriate. Used stoves may be approved by the building department or the fire department. Every solid fuel-burning room heater shall bear a permanent and legible factory-applied label containing at least the following information:

1. *Manufacturer's name and trademark*
2. *Model and/or identification number of the appliance*
3. *Type of fuel(s) approved*
4. *Testing laboratory's name or trademark and location*
5. *Date tested*
6. *Clearance to combustibles*
   a. *Side*
   b. *Rear*
7. *Test standard*
8. *Label serial number*

Second: Existing chimneys should be checked for the presence of a flue liner and general structural condition. A smoke test may be used to determine if the draft is adequate, if the flue is without obstruction and if there is any smoke leakage. A visual inspection of the chimney is needed to check for creosote deposits, surface cracks or breaks, and if the damper is in good working order. The following two areas related to the chimney are important to inspect. The area where the chimney penetrates through the floor of ceiling joists should be checked to be sure that there is at least two inches clearance between combustible materials and the chimney.

Third: Chimneys and chimney connectors shall be installed with the required clearances (see installation clearance table). The connector should be sloped upwards toward the chimney and the connections overlapped upwards to prevent creosote leakage. A two inch clearance shall be maintained where insulated pipe penetrates a combustible wall, unless it is tested and approved for lesser clearances.

A non-combustible hearth must be provided. Most stoves have legs and allow air to pass below; if the legs are not present, an air space below the non-combustible hearth must be provided. Clearances vary with circulating and radiant stoves. In general, a non-combustible shield should be installed with ventilation behind it for lesser clearances, no protection for large clearances, and if the wall is a concrete foundation wall, a minimum distance may be allowed.

STANDARDS

Test procedures have been developed by Underwriter Laboratories and the Canadian Standards Association for testing of different types of solid fuel appliances and chimneys. The standards are as follows:

U.L. 103 — **FACTORY BUILT CHIMNEYS:**

Concerns residential type chimneys used in conjunction with gas, liquid and solid fuel appliances.

U.L. 127 — **FACTORY BUILT FIREPLACE:**

Concerns metal fireplaces, consisting of fire chamber, chimney, and related parts designed to be built into a wall.

U.L. 737 — **FREE STANDING FIREPLACES:**

Concerns fireplaces which are free standing fire chamber assemblies. These units are typically made of lighter weight metal and have open fire chambers which cannot be closed.

U.L. 1482 — **WOOD AND COAL BURNING STOVES:**

Concerns room heaters which are free standing fire chamber assemblies of the circulating or direct radiation type.

C.S.A. B366-M1979 — **SOLID & LIQUID FUELED CENTRAL HEATING APPLIANCES:**

Wood, coal, and oil burning hot water or hot air central heating appliances.

U.L. — Underwriter's Laboratories

C.S.A. — Canadian Standards Association

A.S.M.E. — American Society of Mechanical Engineers (Any type of water pressure vessel should bear a stamp from this organization.)

INSTALLATION

The installation of any woodburning stove and chimney must conform to these provisions of the Massachusetts State Building Code or manufacturers' recommended procedures (as required by the lab tested requirements).

1. **PERMIT:** A permit must be secured prior to installation of a woodburning stove. The application for the permit shall be accompanied by a list of components to be assembled and a diagrammatic sketch of the planned installation. (Code 113.5).
2. **LABEL:** Every new woodburning stove to be installed in Massachusetts must be labeled as having been tested (see standards) by a laboratory accredited by the State Building Code Commission. (Code 2109. 8).
3. **CHIMNEY (General):** Every woodburning stove shall be connected to either an existing chimney or a new chimney. All chimneys shall be secured at each floor level or at least every 10'-0" and adequately supported. All spaces between chimneys, floors, and ceilings shall be firestopped to a depth of two (2") inches. (Code 2109.1, 2108.2).
   A. **FLUE:** The flue area shall not be smaller than the areas shown in Table 2108.3.2.7. (Code 2108.2.2, 1001.3).
   B. **MULTIPLE FLUE CONNECTIONS:** A solid fuel burning heating appliance may be vented into a common flue of a masonry chimney with a liquid fuel burning device provided that:
      1. The flue does not also vent a working fireplace.
      2. The solid fuel burning appliance's connector, if separate, shall enter at a minimum of six (6) inches below the liquid fueled appliance's connector pipe.
      3. All appliances shall be approved by the appropriate state agencies.
      4. The flue shall be of sufficient size to serve all the units connected to it if operated simultaneously (see Table 2108.3.2.7).

   Note: While the building code does allow for this, it is not a highly recommended practice.

Table 2108.3.2.7
CAPACITY OF A MASONRY CHIMNEY SERVING TWO APPLIANCES

Total Vent Height (feet) of Not Less Than	Combined Appliance Input Rating of Not Greater Than (Thousands of Btu's per Hour)				
8	81	118	162	277	405
10	89	129	175	300	450
15	105	150	210	360	540
20	120	170	240	415	640
30	135	195	275	490	740
50	—	—	325	600	910
	Linear Dimensions with Equivalents				
nominal liner size (in.) (sq./rect.)	4x8	4x8	8x8	8x12	12x16
inside dimension of liner (in.)	2½x6½	2½x6½	6¾x6¾	6½x10½	9½x13½
inside diameter (in.) (circular)	6	7	8	10	12
equivalent area (square in.)	28.3	38.5	50.3	78.5	113.0

C. **CLEAN OUTS:** Every flue shall be provided with a clean out and a tight fitting cover. (Code 2108.2, 1001.4)

D. **CAP:** It is recommended that all chimneys have caps and spark arresters.

E. **HEIGHT:** Chimneys shall extend at least three (3) feet above the highest point where they pass through the roof of a building and at least two (2) feet higher than any portion of a building within ten (10) feet. These are minimum design standards, the chimney must be of adequate height and area to provide proper draft (see installation checklist). (Code 2108.3.2.6, 2108.5.1.1).

F. **MASONRY:** Masonry chimneys shall be constructed in an approved manner of solid masonry units or reinforced concrete. Every masonry chimney shall have an approved flue liner. Required clearances shall be maintained from combustible construction. Existing unlined chimneys shall have approved flue liners installed. (Code 2108.3).

G. **FACTORY BUILT:** Single wall pipe shall not be used as a chimney. Exterior and interior chimney shall have a clearance of not less than two inches (2") from combustible construction, or shall be installed to manufacturer's recommended clearances, according to test results. Factory built chimneys shall be tested and labeled showing compliance to U.L. Standard 103.

4. **CONNECTOR PIPE:** Single wall connector shall be constructed of not less than the gauges in Table 2108.6 . It may only be used within the room where it originates from the solid fuel appliance. The area of the connector shall not be less than that of the appliance's smoke outlet. Minimum clearances between the pipe and combustible construction are shown in Table 2108.6.2 (see installation checklist). The maximum length of the connection run shall not exceed 75% of the total chimney height.

   The connector shall slope down away from the chimney a minimum of ¼" per foot. Chimney and connector sections shall be installed so that the pipe joints overlap with the upper pipe placed snuggly into the lower pipe.

Table 2108.6
MINIMUM CHIMNEY CONNECTOR GAGES

Diameter of Connector	Inch Thickness	Birmingham or Stubs Gage
Less than 6"	0.022 in.	24
6" to less than 10"	0.028 in.	22
10" to 12"	0.034 in.	20
13" to 16"	0.040 in.	18
Greater than 16"	0.064 in.	16

Note: The corrosive resistance shall be equivalent to or better than galvanized metal.

Table 2108.6.2
CONNECTOR PIPE CLEARANCES

DIAMETER Inches	CLEARANCE* Inches	REDUCED** Clearance
0–12	18	9
12–36	20	10
36+	36	18

*Distance from connector to combustibles
**Distance from insulated combustibles

5. **COMBUSTION AIR:** Most homes have some degree of infiltration, but in a case where the building is so airtight that normal infiltration does not occur, provisions for combustion air may need to be provided. (Code 2109.5)
6. **HEARTH:*** The solid fuel burning appliance shall be mounted on a hearth of masonry or other non-combustible materials with not less than one-hour fire resistance and shall extend twelve (12") inches beyond the appliance on all sides and eighteen (18") inches on the fuel and ash access side. (See installation check list) (Code 2109.3)
   *Note: the non-combustible hearth shall be permanently installed on the finished floor or sub-floor.
7. **DAMPER:** A damper of No. 12 steel (.11 in., Birmingham or stubs gauge) is required within the stove installation. (Code 2108.7.5)
8. **USED SOLID FUEL ROOM HEATERS:** All used stoves shall be inspected by the building department or fire department, and approved prior to issuance of the installation permit. (Code 2109.7, 800.6)

   Existing used stoves should be checked for the following: a) cracks and gaps in the body; b) loose welds or cement; c) thin spots; d) rust or corrosion; e) inoperable moving parts (i.e. damper, doors, vents, etc.)
9. **CLEARANCES:** All solid fuel burning stoves shall be installed with the specified minimum or reduced clearances or manufacturer's clearances as laboratory tested (See figure 2109.4 and table) (Code 2109.4)
10. **FIREPLACE INSTALLATION**
    A. Fireplace stove—adapted or designed for installation into the face of a fireplace. (Figure 9.1)
    B. There are problem areas to be considered when connecting directly into the removed damper or with a non-combustible fireplace closure. The removed damper method may have problems with condensation build-up which results in pipe deterioration. The fireplace closure may have draft and excessive creosote build-up problems caused by the large volume of cold air in the fire chamber. A third method (not illustrated here) is to install the stove connector into the wall above the fireplace so that it enters directly into the flue. (Code 2109.6) (Fig. 9.3, 9.4)
    C. Fireplace inserts (see definition) (Fig. 9.2)

Note: Hearth must adhere to the same requirements as when installing a stove in a room.

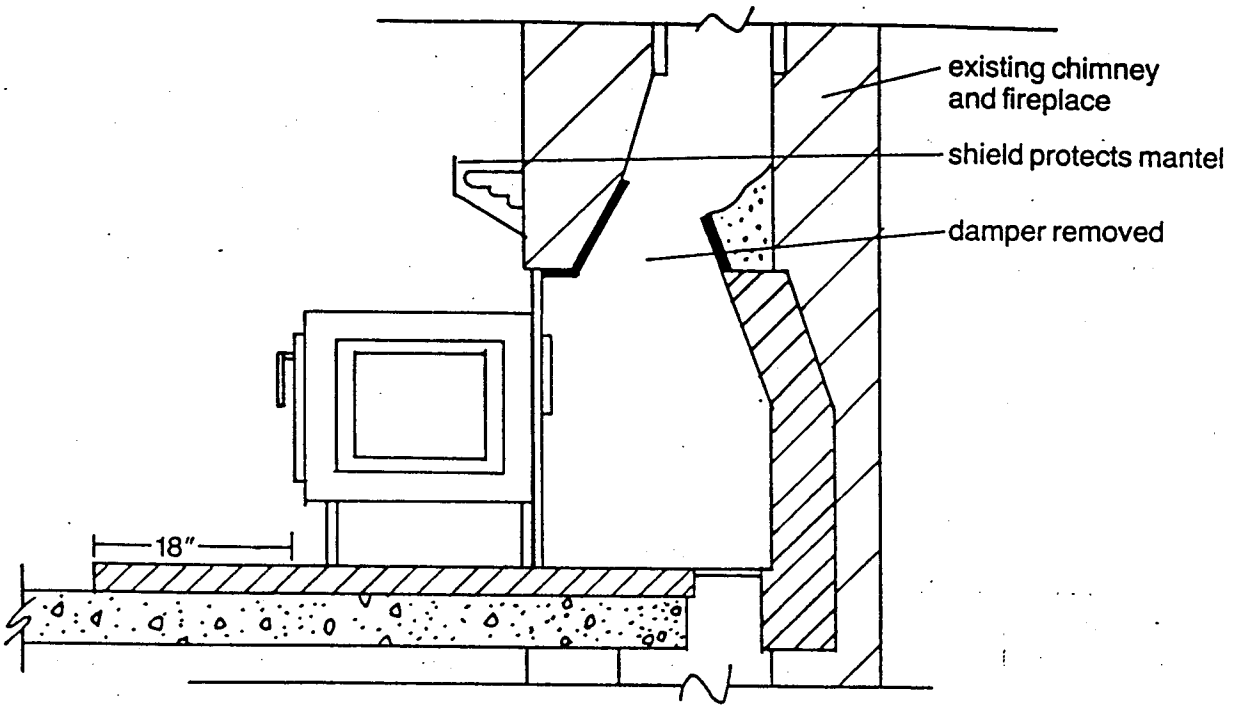


Figure 9.1
TYPICAL FIREPLACE STOVE INSTALLATION

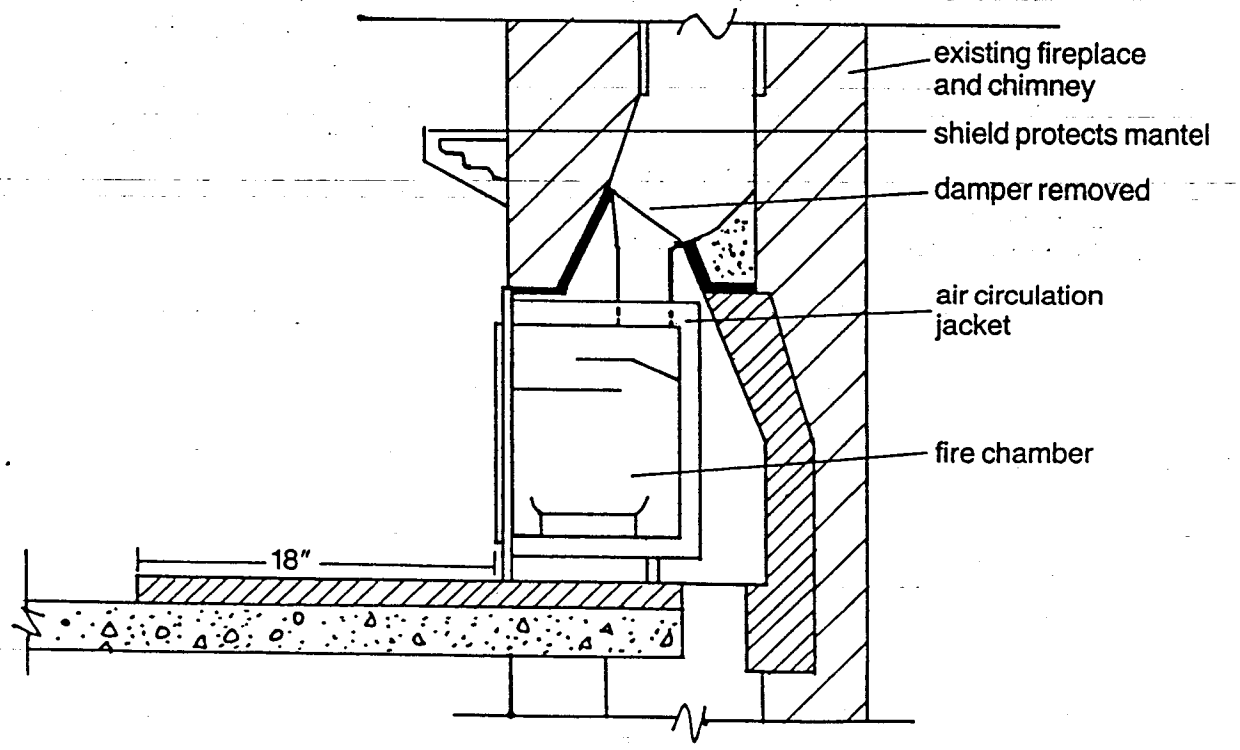


Figure 9.2
TYPICAL FIREPLACE INSERT INSTALLATION

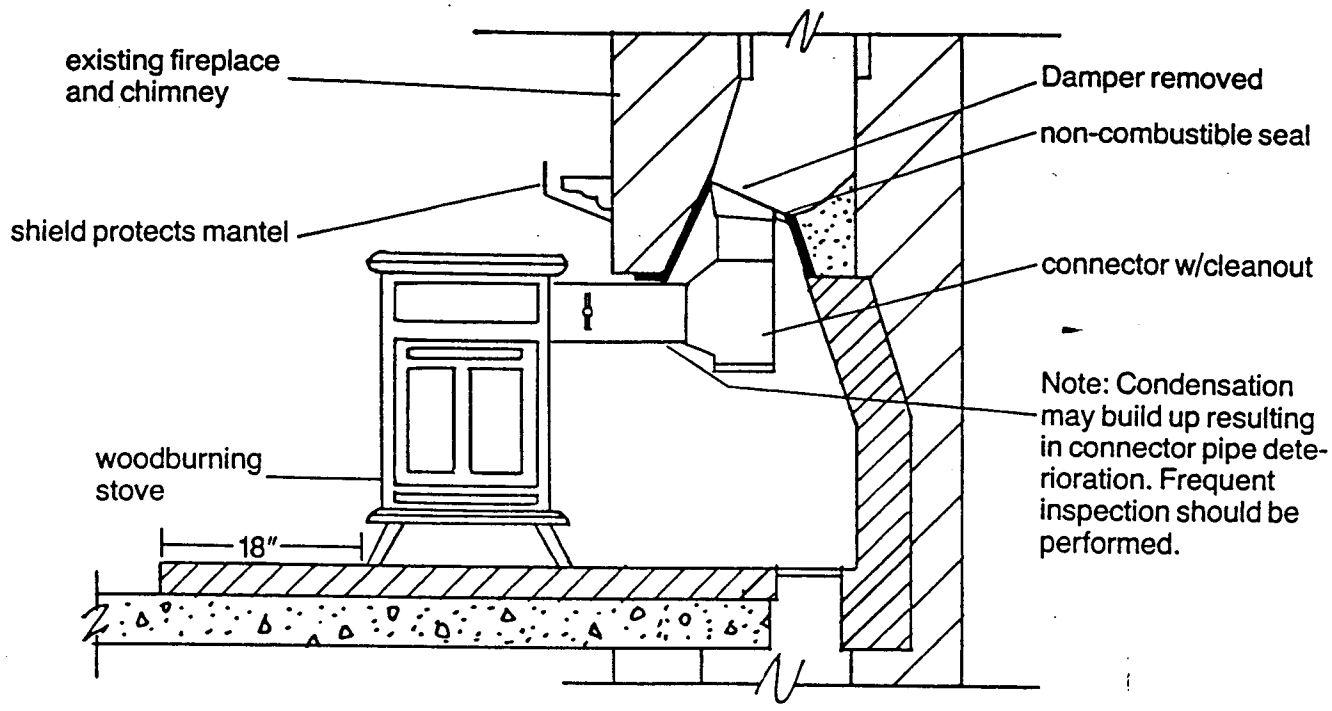


Figure 9.3
TYPICAL STOVE CONNECTED INTO FIREPLACE DAMPER

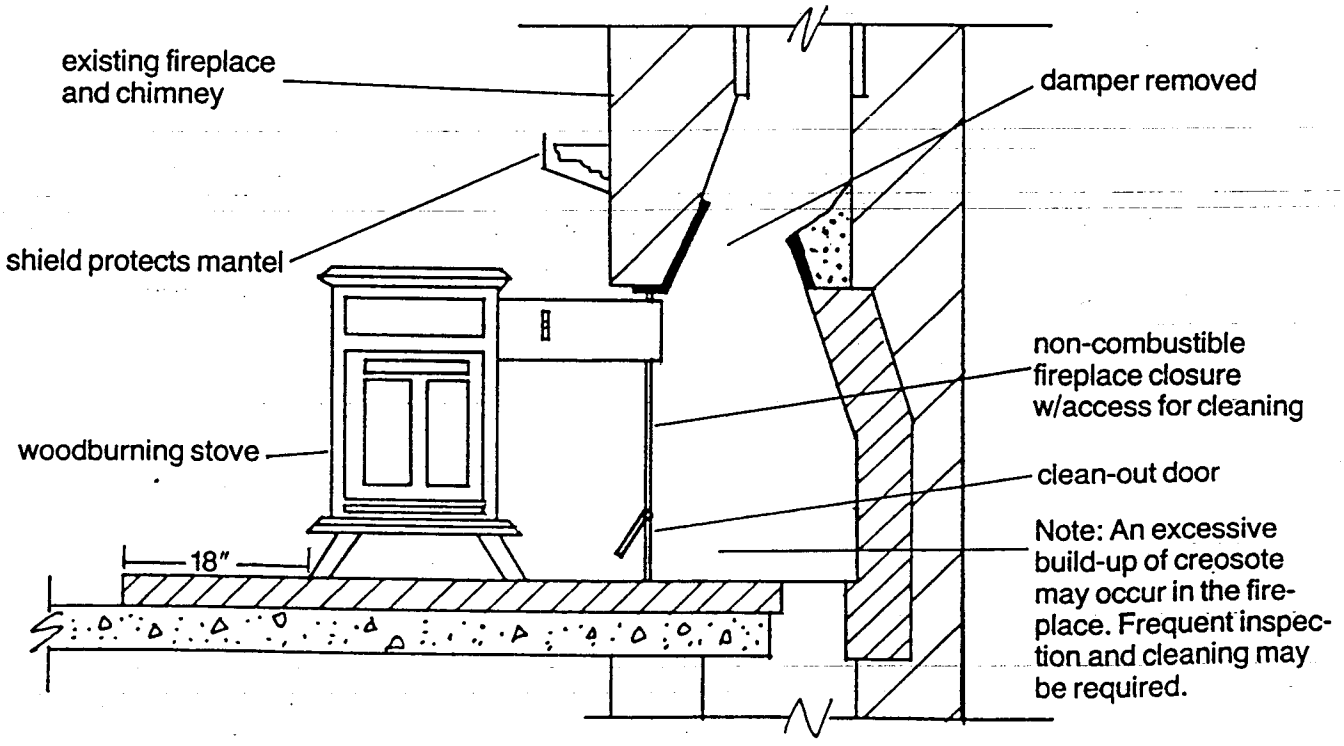


Figure 9.4
TYPICAL STOVE CONNECTED INTO A FIREPLACE CLOSURE

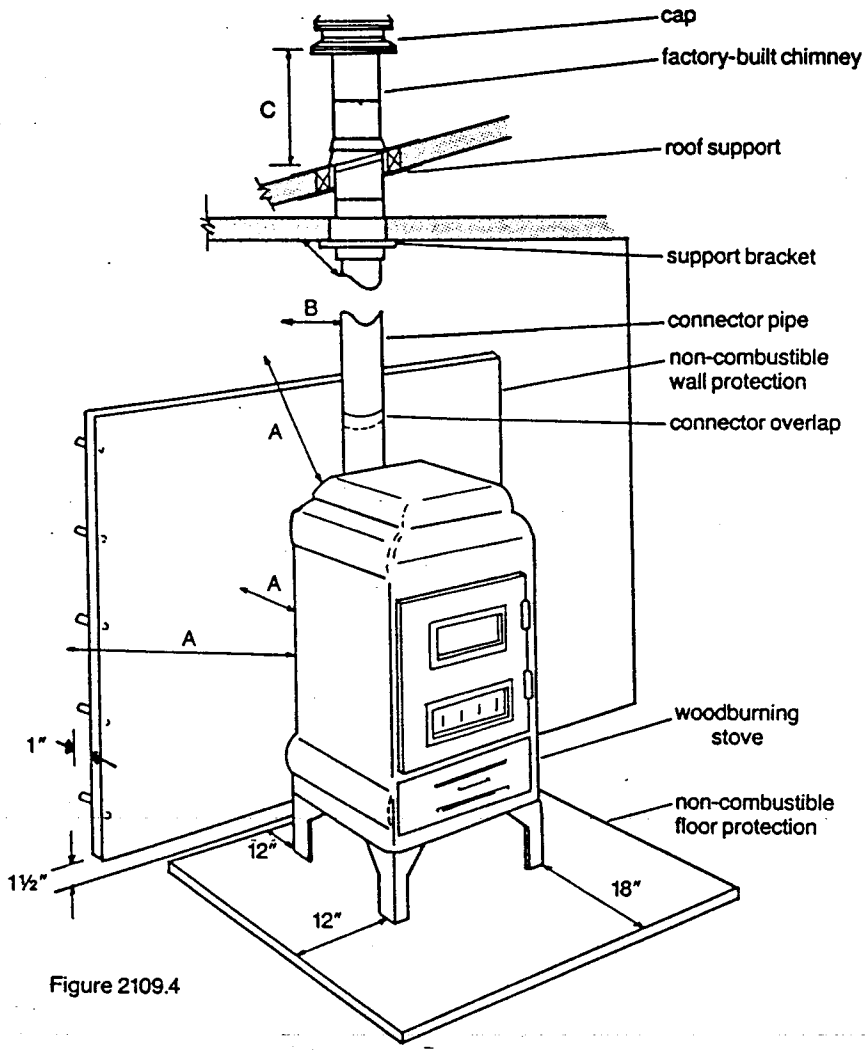


Figure 2109.4

Figure 2109.4

STOVE INSTALLATION CLEARANCES

Stove Components	Combustible Material	½" Asbestos Millboard Spaced Out 1" 2.	Concrete/Masonry Foundation Wall	Spaced Out 1" 4" Brick Veneer
Radiant Stove 1. —Front	36"	—	—	—
Circulating Stove 1. —Front	24"	—	—	—
A. Radiant Stove 3. —Side/Back/Top	36"	18"	6"	18"
A. Circulating Stove —Side/Back/Top	12"	6"	6"	6"
B. Single Wall Connector Pipe	18"	12"	6"	8"
B. Insulated Connector Pipe	2"	2"	2"	2"
C. Chimney Height (Metal or Masonry)	Three (3) feet above adjacent roof and two (2) feet above any roof ridge within 10 feet			
D. Damper	If a damper is not included in the stove construction, it must be installed in the connector pipe.			

1. Front: Fuel or ash access side.
2. Non-combustible spacers required.
3. Clearances on each side of a radiant stove with a heat shield shall be measured as if a circulating type.

Note: Clearances shall be measured perpendicular to stove body.
Laboratory verified test clearances permitted.

WOOD STOVE INSTALLATION CHECKLIST

Permit

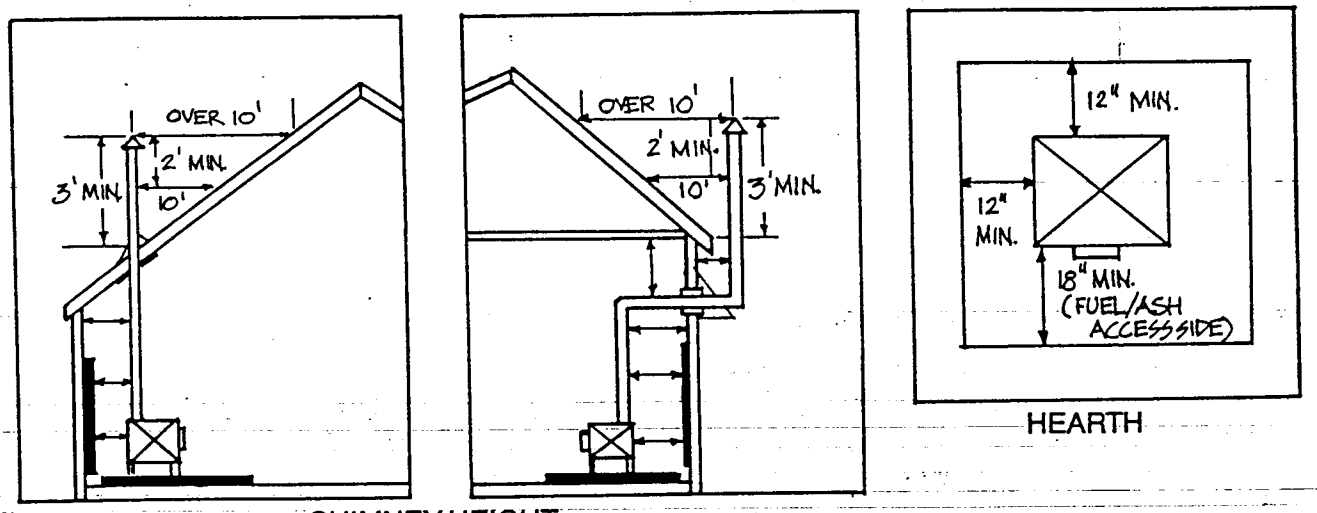
A building permit is required for the installation of any solid fuel burning appliance. The building permit and installation inspection are limited to the stove installation and not to the stove construction.

Stove

A. New _____ Used _____
B. Type/radiant _____ Circulating _____
C. Manufacturer _____ Lab. No. _____
Name/Model No. _____ Collar size _____
Dimensions/Height _____ Length _____ Width _____

Chimney

A. New _____ Existing _____
B. Size (flue area) _____
C. Other appliances attached to flue (Number and flue size) _____
D. Prefab (Manufacturer—name and type) _____
E. Masonry/Lined _____ Flue liner _____ (type & manufacturer)
Unlined _____
F. Height (refer to diagrams) _____ cap _____



CHIMNEY HEIGHT

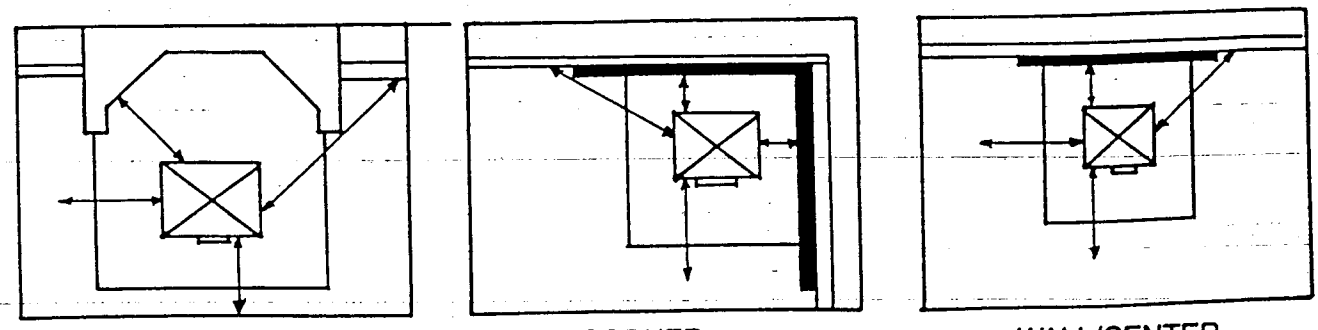
HEARTH

Hearth (non-combustible)

A. Materials _____
B. Sub-floor construction _____
C. Minimum dimensions (refer to diagram)

Clearances and Wall Protection (see stove installation clearances chart)

A. Type of wall protection provided _____
B. Clearances (refer to diagrams)



FIREPLACE

CORNER

WALL/CENTER

When considering the type of wood to burn, other characteristics in addition to heat value are often important. These characteristics include: (1) ease of splitting, (2) ease of ignition and burning, (3) extent of smoking, (4) extent of sparking, and (5) coaling qualities.

Wood is generally classified in two groups: Softwoods (evergreens–coniferous) and hardwoods (leaf bearing–deciduous). Softwoods, being resinous, are easy to ignite and burn rapidly with a high, hot flame. However, they burn out quickly and require frequent attention.

Hardwoods are generally more difficult to ignite, burn less vigorously and with a shorter flame, but last longer and produce more coals than softwoods. Hardwoods and softwoods give off approximately the same energy for a given weight. Mixing the two woods will give a fire with the best characteristics of both woods.

Green wood should only be used under limited conditions; seasoned wood is preferable.

Green wood has a high moisture content, and gives off less heat and produces creosote when burned. It can be used in a very hot fire when mixed with dry woods to prolong burning time. If green wood is used in this way, the stove and chimney will have to be checked more frequently for creosote buildup and cleaned more often.

Green wood can be purchased during the winter or spring to use the following heating season. By buying your firewood green in the winter or sping you can avoid shortages of firewood as well as save money. Green wood costs less, especially when bought in four foot or eight foot length. By splitting green wood and stacking it in a pile that allows for good air circulation, and is protected from ground moisture and rain, the wood will dry faster.

TABLE 1 Characteristics of Commonly Burned Wood.

Species	Easy to Split	Ease of Starting	Heavy Smoke	Sparks	Coaling Qualities
Apple	yes	poor	no	few	excellent
Ash	yes	fair	no	few	good
Beech	no	poor	no	few	good
Birch (white)	yes	good	no	moderate	good
Cherry	yes	poor	no	few	excellent
Cedar	yes	excellent	yes	many	poor
Elm	no	fair	medium	very few	good
Hemlock	yes	good	medium	many	poor
Hickory	yes	fair	no	moderate	excellent
Locusts (black)	no	poor	no	very few	excellent
Maple (sugar)	yes	poor	no	few	excellent
Oak (red)	yes	poor	no	few	excellent
Pine (white)	yes	excellent	medium	moderate	poor
Spruce (Norway)	no	good	yes	moderate	poor
Willow	yes	fair	no	few	poor

When cutting wood, consider the dimensions of the firebox. Dangerous situations can result from poor planning, such as stove doors having to be left open to accommodate long logs.

WOODLOT MANAGEMENT

The Department of Natural Resources is required by law to perpetuate, extend and properly manage both public and private forest lands of the Commonwealth. This is accomplished through advice and demonstration of proper methods of planting, weeding, pruning, thinning, and harvest cutting.

Department Foresters furnish free forestry advice and service up to two days per woodland owner annually. This may include technical forestry demonstrations, brief forestry management plans, minor amounts of timber marking and estimating as a help in marketing and utilization of wood products.

Requests for local assistance should be made through Massachusetts Department of Natural Resources regional field office as follows:

Berkshire County
Forester, Regional Forest Headquarters
Cascade Street, Pittsfield 01201
Tel: (413) 442-8992

Franklin, Hampden and Hampshire Counties
Forester, Regional Forest Headquarters
Box 484, Amherst 01002
Tel: (413) 549-1461

Worcester County
Forester, Regional Forest Headquarters
P.O. Box 155, Clinton 01510
Tel: (617) 365-5908

Middlesex County
Forester, Willard Brook Forest Headquarters
P.O. Box 111, West Townsend 01474
Tel: (617) 597-8802

Essex County
Forester, District Headquarters
Bradley Palmer Park, Topsfield 01983
Tel: (617) 887-5775

Plymouth, Barnstable, Dukes and Nantucket Counties
Forester, Regional Forest Headquarters
Box 66, South Carver 02566
Tel: (617) 295-2135

Bristol and Norfolk Counties
Forester, F. Gilbert Hills State Forest
Mill Street, Foxboro 02035
Tel: (617) 543-5850

A consulting forester is a person professionally educated in forestry who performs services for clients on a fee, contract or other basis. The consulting forester may operate as an individual or be a member of a firm or corporation. The client may be a private landowner, a bank, a forest industry company or anyone in need of forestry advice.

Fees charged by consulting foresters vary with different kinds of services performed. They may be based on the amount of time required to do the work, on the acreage of woodland involved, on a prearranged contract price, or on a proportion of the amount realized from the sale of products.

Names and addresses of consulting foresters working in Massachusetts may also be obtained from: **City Forester,** Mass. Department of Natural Resources, Division of Forests and Parks, 100 Cambridge Street, Boston, MA 02202, Tel: (617) 727-3186

COAL BURNING

Many people are now turning to coal as an alternative fuel for heating, both because of its availability and its economy.

One ton of hard coal (anthracite) will provide approximately as much heat as 1 to 1.2 standard cords of efficiently burned, seasoned hardwood. It is difficult to determine the amount of coal that would be used per day during the regular heating season, but a reasonable estimate would be 40–50 pounds per stove.

Coal is readily available in most areas and may be purchased in varying amounts from 50 pounds to several tons. As with most products, the more you purchase, the lower the cost per unit.

Do some comparison shopping regularly to be sure you are getting the best fuel buy for your dollar.

Since 1979 the sales of anthracite coal stoves using "chestnut" size coal increased dramatically. The production of chestnut size anthracite coal, has not been able to increase as quickly as this new demand. Therefore, until 1983 and possibly beyond, there will be the potential for spot shortages of anthracite coal especially in the winter months. To avoid this inconvenience the coal dealers suggest that those burning anthracite coal, especially the chestnut size, buy their winter supplies early in the summer when coal production is highest.

MEOER also cautions coal stove owners that substituting anthracite coal with bituminous or "cannel" coal may be dangerous due to volitile and toxic gases released when softer coal is burned.

Type of Coal:

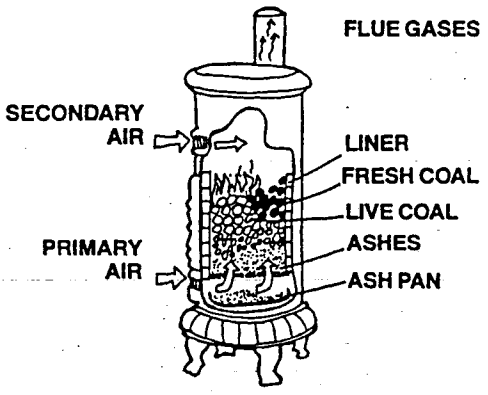
Anthracite (hard coal) is the type most recommended for home heating. It has more energy per pound than any of the others. It burns freely and uniformly with a short blue flame and produces little if any smoke when properly burned. The sizes of coal vary from $^{9}/_{16}$–$^{13}/_{16}$ inch, $^{13}/_{16}$–$1\frac{5}{8}$ inches, and $1\frac{5}{8}$–$2^{7}/_{16}$ inches.

Bituminous (soft coal) is not as desirable as hard coal for residential heating, as it creates dust when handled and produces large amounts of smoke and soot when burned at a slow rate. Also, soft coal from some areas contains a high sulfur content, but a large portion of it may be removed if the coal is cleaned.

Cannel coal may be burned in fireplaces, but should not be burned in a heater or any closed container. It contains substantial amounts of volatile materials which tend to expand when heated. If burned in a confined area, such as a stove, the fire will be too big and too hot to be readily controlled and small explosions of the volatile matter may occur.

Combustion

The kindling temperature (when a fuel starts to change from its solid state to a combustible gas) of wood is approximately 550°F and coal is 660°F. Thus, more heat must be held within the fuel bed to keep a coal fire properly ignited. Coal does have the advantage that its moisture content is much lower than most hardwoods so less heat is wasted to drive off moisture and no heavy oils, tars, or creosote are formed.



To burn coal, *primary air* enters a firebox through a bottom draft control and rises up through the coal resting on the grate. Oxygen in the air combines with the carbon in the glowing coal to form carbon dioxide. As the air moves through the coal, the oxygen is depleted and carbon monoxide is formed. A fresh supply of *secondary air* enters at the top of the firebox and combines with the carbon monoxide and other volatile distillates to cause complete combustion.

Carbon monoxide, a colorless, odorless and very poisonous gas is formed by incomplete burning of the coal because the oxygen in the primary air supply has been depleted. It is very important that the proper amount of secondary air enter the firebox near the top of the glowing coals to supply the oxygen necessary to change the carbon monoxide to carbon dioxide to:

- prevent poisonous gas from entering the house to create a health problem or death
- assure complete combustion of the fuel and reduce the amount of unburned gases being exhausted out of the chimney
- reduce the possibility of "puff-backs" when the heater door is opened to tend the fire.

A properly maintained coal fire has a deep fuel bed of glowing coals and the volatile gases burn just above the fuel bed with a short, blue flame.

The Stove/Heater

Stoves and heaters are available for burning just coal. It is easy to burn wood in a coal burning stove but it is impractical to try to burn coal in a stove designed to burn wood because of the different conditions required for the satisfactory burning of coal.

The stove or heater designed for burning coal must have a properly sized fire box, about 14" in diameter and at least 10" deep, *a coal grate (not a wood grate)* and both primary and secondary air supplies. Also many coal burning stoves are thermostatically controlled, a feature that is more important on a coal than on a wood burning stove to maintain a higher fire box temperature.

The grate supports the fuel bed so that air may be supplied to the fire and so that ashes may be removed from the fuel bed. To burn small coal pieces ($^{9}/_{16}$–$^{13}/_{16}$ inch), the distance between the grate openings should be approximately three quarters of an inch; to burn medium size coal pieces ($^{13}/_{16}$–$1\frac{5}{8}$ inches) a smaller size grate opening is needed. A standard wood grate is not suitable for burning coal.

Well designed wood-coal combination stoves are available. All too often, though, so-called combination stoves do not burn coal efficiently. Many people that have attempted to burn coal in a combination stove have given up or failed to efficiently burn the fuel. It is really best to buy a stove designed to burn coal, in which wood can also be burned.

Coal Burning Tips

- To start a coal fire, place a small amount of crumpled paper and sticks of kindling wood on the ash-covered grate. After the paper and wood are burning briskly, cover with a thin layer of coal. As the first layer of coal becomes ignited, more should be added gradually until the fire bed is built up to approximately 8" deep. As fresh fuel is added always leave some of the glowing coals uncovered.
- **Never** use kerosene, gasoline or lighter fluid to start a fire.
- A satisfactory method of firing consists of drawing the top red coals toward the front of the firebox and piling fresh fuel toward the back.
- The grate must be protected from direct contact with the fire by a layer of ash one or two inches thick. The ash left on the grate will help prevent overheating of the iron casting and coal from falling through the grate openings.
- Shaking a fire should only be done if room is needed for fresh fuel or if the ash accumulation on the grate is excessive; generally once or twice a day is sufficient. Use a few short strokes and stop when the first red coals appear. Undershaking restricts the amount of air that reaches the fire and overshaking may cause the fire to go out. Screen the ashes through a piece of ¼ or ⅜" mesh hardware cloth to recover any unburned coal that has fallen through the grate.
- A coal fire should never be poked or broken up as this serves to bring ash to the surface of the fuel bed where it may fuse into lumps or clinkers which interfere with proper burning.
- To bank the fire for the night, pile the coal higher at the back of the firebox and allow it to slope toward the fuel door. Always leave some red or burning coals uncovered in the front of the firebox.

There remain some very serious concerns about the residential use of coal. These concerns are primarily centered around the question of air pollution caused by coal burning. It is known that the burning of coal produces carbon monoxide, sulphur oxides as well as particulate emissions and these emissions are quite evident in residential coal use. It has also been noted that urban air quality improved dramatically during the 1950's and early 1960's. A major reason for this improvement was a rapid conversion away from coal as a residential fuel. As coal use is increasing again, these concerns will continue to present themselves.

OPERATION

Proper operation of the stove is one of the most important and difficult areas to consider. All wood stoves behave differently. Even a single stove will react differently to different wood or loading conditions. Careful reading of the operation instructions is of primary importance. Airtight stoves are only as efficient and as safe as the operator.

Small fires should be built initially to season a cast iron stove and prevent rapid expansion and damage to the metal. Some manufacturers recommend a layer of ashes to be placed at the bottom of the stove initially. A roaring fire may result in damage to a cold stove.

The following methods of operation provide safe use guidelines and limit creosote build-up.

1. Open the damper and air inlets on the stove all the way.
2. Crumple or shred newspaper (avoid the use of glossy magazine paper) and place them in the stove.
3. Stack small pieces of dry kindling (i.e., split pine and cedar).
4. Light the paper and wait until the fire is blazing, then add larger pieces of wood, stacking them so the air can circulate freely around them.
5. After 30 minutes or so close down the air controls to the desired location.
6. Never use a petroleum product such as gasoline or lighter fluid to start a fire in a stove. This is such a successful method of starting a fire that an explosion or flashback may occur and your whole house may become part of the blaze.
7. When reloading a stove with a bed of hot coals the damper and air inlets should be reopened completely.
8. After 30 minutes or so close down the air controls to the desired setting.
9. Repeat this procedure at the end of the burning cycle, when only coals are present. This will allow the fire to burn hotter and the added air will promote more complete combustion, to limit creosote build-up.

Two additional areas to consider when operating a woodburning stove are the wood storage and ash disposal.

Combustible Room Contents:

Many people store their wood or kindling in combustible containers kept close to their stoves or they may use the stoves to dry clothes. Combustible wood containers, clothing or furniture should be kept the same distance away from the stove as any unprotected wall surface (36 inches).

Ash Disposal:

One of the by-products of burning wood is ash. Remove ash with a shovel and place it in a heavy metal bucket. Assume that there are still hot coals mixed in with the ashes (there usually are) and do not place them in the garbage in or near anything combustible.

MAINTENANCE

Maintenance of solid fuel burning devices is generally limited to cleaning of the chimney and disposal of the ash accumulation. A visual inspection should be made periodically of the chimney exterior for deterioration.

1. **Creosote:**

When wood burns, the combustion process is never absolutely complete. The smoke usually contains a substance called creosote which is dark brown or black and has an unpleasant odor. Its chemical composition is not well known because it is a very complex mixture of compounds.

When the stove pipe or chimney flue temperature drops below 250°F, creosote will condense on the surfaces. At very low temperatures, below 150°F, the creosote deposit is quite fluid. As these deposits are warmed they coagulate and form a sticky tar-like substance which, when very hot, will ignite causing a chimney fire and the danger of a home fire.

The amount of creosote condensing on the surfaces of the system varies according to the density of the smoke, the temperature of the surface and the type and dryness of wood being burned. Dense smoke from a smoldering fire carries the most unburned creosote.

Unfortunately, creosote problems are most effectively reduced by reducing the efficiency of the heating system. Air circulating in the stove causes more complete combustion and more heat escaping up the chimney—which heats the chimney to prevent creosote build up.

In order to keep creosote buildup in your chimney to a minimum, flue temperatures should be 275 °F–300 °F. You lose approximately 1 ° of heat or temperature per foot of chimney. For example, if the temperature of the exhaust gases leaving the stove are 285 °F, and the length of the flue or chimney is 20 'the temperature of the gases leaving the top of the chimney would be 265 °F, which would be a cool temperature causing the gases to condense into creosote buildup in the chimney. The way to correct this would be to shorten the chimney run (drafting & code considerations) or to burn your stove hotter. There are chimney thermometers and/or charts available to help you determine flue temperatures from your wood stove dealers.

The more efficient stoves deliver larger amounts of heat to the room therefore reducing temperatures in the stove pipe and chimney. This reduced temperature also increases the chances of creosote deposits. Therefore creosote problems are more severe in the newer, more efficient stoves than in open stoves or conventional fireplaces.

2. **Chimney Fires:**
Combustion of creosote deposits are likely to occur during a very hot fire. A very intense fire results, creating a roaring noise and producing flames and sparks from the top of the chimney. Chimney fires weaken the masonry in the chimney, can create fires on the roof and are not a safe way to remove creosote from a system.

Follow these steps if you have a chimney fire:

a. Call the Fire Department immediately.
b. Close all openings and draft controls on the stove.
c. If the fire is still burning vigorously, squirt a fire extinguisher or throw baking soda onto the fire in the stove. The chemical travels up the chimney and often extinguishes the flame.

One method suggested to reduce creosote buildup is to deliberately have a hot fire for 15 to 30 minutes each day. This hot fire tends to burn off the creosote in very small amounts, thus eliminating the buildup problems (a questionable safety practice).

3. **Chimney Inspection:**
Stove pipes and chimney flues should be inspected frequently for creosote buildup, especially during the first wood burning season. One method for checking stove pipes is to tap on the pipe with a metal object. The sound will change from a metal ping to a dull thud as materials build up inside the pipe. The chimney may be inspected from the roof or, in some cases, a mirror can be used to look up through the chimney flue. If you use an airtight stove, check the stove pipes once a month.

4. **Chimney Cleaning:**
The chimney needs cleaning to prevent chimney fires and to improve the draft. How often the chimney is cleaned depends on how frequently the stove is used and how it is operated. Some people recommend cleaning the chimney after every third cord of wood is burned; some recommend once a year. Any time an inspection shows excessive soot and creosote, the chimney should be cleaned.

Chimneys are normally cleaned by mechanical means to scrape off any loose creosote buildup. Liquid or baked-on creosote is almost impossible to remove. Some people recommend pulling a bag containing wire netting weighted with chains or rocks up and down the chimney; others just use tire chains or wire netting without a bag (these methods could damage the liner and/or the chimney). Stiff wire chimney cleaning brushes are used by professional chimney sweeps and are available at reasonable cost. If you clean the chimney be very careful when climbing on high, steep roofs. Be sure to cover any opening into the house with plywood to keep out soot. You may, instead, want to hire a chimney sweep who has the proper safety equipment.

Chemicals, such as sodium chloride or table salt, are sometimes used as a chimney cleaner. The chemical combines with water released from a hot fire to form a weak acid that dissolves small amounts of creosote. There is considerable controversy as to how safe and/or effective such chemicals are.

Even with the most conscientious cleaning habits, the owner of the woodstove still faces some danger of fire; formation of creosote is a natural process resulting from the burning of wood. Although a properly installed woodburning stove and properly constructed chimney can withstand an occasional chimney fire, everything possible should be done to reduce the possibility of such fires. If one does occur, the stove and chimney should be thoroughly inspected before it is used again (chimney and connectors may need to be disassembled).

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   11—Heating Equipment and Appliances, Mounting, Clearances and Connectors
   12—Fire Protection and Fire Extinguishing
   21—Building Code Provisions for One and Two-Family Dwellings

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5. "Heating with Wood" and "Burning Wood Safely," New England Regional Commission.
6. National Fire Protection Association, NFiPA 211, 89M, HS 8.
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